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Notes on Carex.—II.

BY L. H. BAILEY, JR.

CAREX STRICTA, *Lamarck.*

One of the most remarkable instances of the general acceptance of an early error occurs in the case of *Carex stricta*. Among all caricographers, so far as I know (unless it be Carey in Gray's Manual), *C. stricta* of Goodenough (Obs. on Brit. Carices, p. 196) has held the preference over *C. stricta* of Lamarck (Dict. de Bot. 3, 387) on account of its supposed priority. Dr. Boott did not confidently adopt Lamarck's name as a synonym of his *C. angustata;* nor was it necessary that he should pay much attention to the name, as he evidently regarded it as more recent than *C. stricta*, Gooden. Sir J. E. Smith, in Rees' Cyclopedia, taking Goodenough's name to be the older, proposed *C. Virginiana* for the plant of Lamarck. Otto von Boeckeler, in Linnæa, 40, 430, adopts Smith's name. Goodenough's name was made in 1792; Lamarck's in 1789. *C. stricta*, Lam., therefore becomes the proper name of the American plant, and the *C. stricta* of Gooden., a European species, must bear some other name. There can be no doubt that Lamarck meant to describe the same plant intended in Dr. Boott's *C. angustata.* His characters can apply to no other Virginian species, unless it be *C. aperta*, Boott, which was separated from the original species at a later day. Sir J. E. Smith reproduces Lamarck's characters and description and, evidently having seen more specimens, adds somewhat to the description. His account of the species, from the American edition of Rees' Cyclopedia, vii, species 100, is as follows:

"*C. Virginiana* (*C. stricta*, Lam.). 'Female spikes two, sessile, erect, with male flowers at the top; male terminal, remote; stem naked.' Stem about a foot high, slender, compressed above, triangular below, rough. Leaves as long as the stem, near two lines

broad, striated. Male spike terminal, an inch long; glumes obtuse, brown, with a white edge. Female spikes distant from the male, sessile, upright, linear, pressed close, reddish brown, with some male flowers at the top; lower one with a bracteal leaf as long as the spike. A native of Virginia, Pennsylvania, etc., described by Lamarck from a dried specimen."

C. xerocarpa, S. H. Wright, Sill. Journ. Sec. Ser. xlii, 334, *C. angustata* var. *xerocarpa*, Bailey, Carex Cat., is simply an attenuated form of *C. stricta*, and it has no characters to separate it from the species. I find it growing from the same tussocks with the ordinary form. Occasionally the inflorescence is reduced to one androgynous spike. *C. Virginiana* var. *elongata*, Bklr., Linnæa, 40, 432, appears from the description to be a very large form of the same.

The synonymy of the species may be arranged as follows:

C. stricta, Lam., Dict. de. Bot. iii, 387 (1789).
C. Virginiana, Smith, Rees' Cycl. vii, sp. 100.
C. acuta, Muhl., Descript. Gram. 263; Torr., etc.
C. stricta, Dewey, Sill. Journ. x, 269; Torr., etc.
C. angustata, Boott, Hook. Fl. Bor. Am. ii, 218.
C. strictior, Dewey, Wood's Cl. Bk. 755.
C. xerocarpa, S. H. Wright, Sill. Journ. Sec. Ser. xlii, 334.

C. aperta, Boott, is perhaps too near *C. stricta*. The reticulated fibres of the lower sheaths of the latter species is the readiest distinction between the two. Careless collectors often fail to secure the lower sheaths, or the fibres are destroyed in pulling up the specimens. Occasional plants will be found in which this character is normally obscure, however. *C. aperta* commonly has shorter spikes than *C. stricta*, and sharper and more spreading scales.

CAREX LIDDONI AND C. ADUSTA.

Carex Liddoni has never been well understood. The species was founded upon a plant collected on the Columbia river by Scouler. Its author regarded it as a near ally of *C. arida*, Schw. and Torr., and expressed a doubt of its distinctness from that species. A subsequent knowledge of the species has definitely separated it from *C. arida*, and has allied it to the apparently far different *C. adusta*. The form of the perigynium is widely different in typical specimens of each species, but it varies much in the intermediate forms. Except in the var. *minor* of *C. adusta*, the ovate or orbicular form of the perigynium readily distinguishes *C. adusta* from the lanceolate-fruited *C. Liddoni*. The most distinctive difference between the two, however, lies in the

colors of their spikes: *C. Liddoni* is always fuscous or fulvous; *C. adusta* is pale or silvery tawny. The following characters will, I think, distinguish the two species:

C. LIDDONI, Boott in Hook. Fl. Bor. Am. ii, 214. Culm erect or nearly so; spikes 3–6, obovoid or oblong, erect, chaffy at the base, fulvous, contiguous or loosely aggregated into an oblong head (about 1′ long); perigynium greenish or tawny, firm in texture, lanceolate (4″–6″ long), thrice as long as the elliptic, brown achenium, few nerved when mature, rough on the narrowly winged margins, very gradually beaked, about the length of the acute, thin-margined scale. *C. adusta, var. congesta*, W. Boott, Bot. Calif. ii, 238.—Mostly at high altitudes, California and northward, eastward to South Park, Colorado, (*John Wolfe*) and Montana, (*F. L. Scribner, 1883*); said to occur on Mt. Graham, Arizona.

C. ADUSTA, Boott, l. c. Top of the culm often inclined or somewhat nodding; spikes 6–12, globose, pale or silvery-tawny, mostly not contiguous, the lower often somewhat compound; perigynium pale or silvery, fragile in texture, ovate or almost orbicular, about twice the length of the oval, mostly dark and shining achenium, strongly many-nerved, minutely serrate above on the broadly winged margins, rather abruptly beaked, about the length and usually rather broader than the scale. *C. argyrantha*, Tuckm. *C. albolutescens*, Schw., *var. argyrantha*, Olney Exsicc. *C. adusta var. argyrantha*, Bailey, Carex Cat. *C. albolutescens var. sparsiflora*, Olney, l. c. (not 591 Hall's Oregon Coll.) *C. adusta var.*, Bailey l. c.—Northeastern States, British America, California.

VAR. GLOMERATA, Bailey l. c. Spikes few flowered, aggregated into a loose, mostly tawny head; perigynium large, almost wingless, nearly filled by the large, dark achenium. *C. albolutescens var. glomerata*, Olney l. c.—Mt. Desert Id., Me., (*R. W. Greenleaf*), New Brunswick (*Rev. J. Fowler*), and from the Saskatchewan region (*Herb. Gray*).

VAR. MINOR, Boott, l. c. Culm 6′–16′ high, very slender towards the top, weak and nodding at maturity, erect when young; leaves narrow, very long pointed; spikes all silvery-brown, the lower rather remote, long-attenuated at the base; perigynium ovate-lanceolate, nearly nerveless. *C. pratensis*, Drejer, Rev. Crit. Car. Bor. 24. *C. adusta*, W. Boott, Wheeler's Rep. 277.—South Park, Colorado (*John Wolfe*), British America, northward to Greenland, eastward to Labrador. Probably a good species.

C. albolutescens var. brunnea, Olney, Hall's Oregon Coll. No. 590, *C. adusta var. brunnea*, Bailey l. c., is *C. leporina L.*

CAREX PYRENAICA AND C. NIGRICANS.

These species have fewer distinguishing characters than were given them by Meyer and Boott. In the Rocky Mountains the species run very close together. Although Dr. Boott regarded "perigyniis ventricosis, majoribus, ore conspicue albo-hyalino aperto" as good characters to distinguish *C. nigricans* from *C. Pyrenaica*, the forms of the perigynium in our specimens furnish no constant differences. They differ as follows:

C. PYRENAICA, Wahl., Act. 139. Two to eight inches high, slender; leaves narrow, mostly involute-filiform, shorter than the culms; staminate flowers few, occupying a third or less the length of the spike; perigynium few-nerved or nerveless, usually shining, little longer than the dark brown or purple scale; spike brown or purple, the fertile flowers erect until full maturity. —High mountains of Colorado to California and northward.

C. NIGRICANS, C. A. Meyer, Cyp. Nov. 211. Stouter; leaves a line or more broad, nearly flat; staminate flowers usually conspicuous, occupying about half the spike; perigynium somewhat ventricose, dull; otherwise as in the last, with which it grows. Evidently the more common species.

SYNONYMY.

Carex Parryana, Dewey, includes *C. Hallii*, Olney, Hayden's Rep., 1871, 496. In the Preliminary Catalogue of Lieut. Wheeler's Survey, Mr. Olney noticed the identity of the two species.

C. Douglasii, Boott, includes *C. Fendleriana*, Boklr., Linnæa, 39, 135 (878 Fendler).

C. rupestris, All., includes var. *Drummondiana*, Bailey Carex Cat., (*C. Drummondiana*, Dewey). The British American plant has been thought to differ from the species in its greater size, longer spikes more attenuated at the base, and more obtuse scales. Specimens from the Pyrenees and from Greenland are exactly like the large forms from British America.

HABITATS.

C. Careyana is credited to Oregon in the Carex Catalogue on the authority of specimens so named in Hall's collection. The specimens are *C. laxiflora* var. *plantaginea*.

C. acutiformis, Ehrh., (*C. paludosa*, Gooden.) was credited to Colorado by Olney, on a plant of King's Survey, too young to be determined. This species is well established at Savin Hill, near Boston, where I have this year collected it.

Mr. Thomas Howell has this year found *Carex cinnamomea*, Olney, at Grave Creek, Southwestern Oregon. This is the second known locality for the species. It was first found by Bolander (No. 6477) on the Red Mountains, Mendocino county, Cal. In some of the specimens the perigynium is minutely pubescent above the middle. The pubescence is evidently deciduous with age.

CARICES UNKNOWN TO AMERICA.

In the Preliminary Catalogue of the Plants of Lieut. Wheeler's Expedition (1874), Mr. Olney introduced the following exotic species upon specimens collected by the survey:

C. lævirostris, Blytt and Fries, upon a specimen of *C. utriculata*, Boott. (No. 1058.)

C. turfosa, Fries, upon *C. vulgaris*, Fries. (No. 1039.)

"*C. personata*, Fries," upon *C. aquatilis*, Wahl., var. *sphagnophila*, Fries. (Nos. 1037 and 1038.) Mr. Olney probably referred to *C. acuta*, L., var. *personata*, Fries.

C. alpina, Swartz, var. *nigrescens*, Anderss., upon *C. alpina*, (No. 1044.) The form referred to Andersson's variety will not fall under the character "spicis omnibus sessilibus, atrofuscis; pumila, rigidula,"—*Anderss. Cyp. Scand.*

C. sempervirens, Vill.? Carex Cat., is *C. frigida*, All.

C. obesa, All., is represented in this country only by its var. *minor*, Boott.

On a New Mimulus of a Peculiar Section of the Genus.

BY J. G. LEMMON.

Mimulus Mohavensis is the name under which I sent specimens of this interesting little plant to Prof. Gray. It is so peculiar that he was at first disposed to regard it as a new genus. But as a related species afterwards received from another source appeared to invalidate the characters relied on, he accepted the view which I had taken of it, and drew up the following character of a new section of the genus, which was needed for its reception:

"§ MIMULASTRUM. Corolla with cylindrical tube and throat included in the turgid 5-angled unequally toothed calyx, gibbous anteriorly near the base; the orifice contracted; limb rotate, refracted, almost regularly 5 cleft; lobes flabelliform-dilated, similar, except that the two posterior are slightly smaller. Character and habit of section *Eunanus*, except in the capsule, the submembranaceous valves of which are placentiferous."

Mimulus Mohavensis. Annual, a span or more high, viscidulous puberulent; leaves oblong and lanceolate, acute and mostly sessile, ½–1 in. long; flowers alternate in the axils, short-peduncled; corolla with a dark crimson eye and a pale border to the lobes, the latter numerously red-veined and glandular-ciliolate, 3–5 lines in diameter.

On sandy slopes or dry washes along the Mohave river, Cal., between Daggett and Waterman, May 10, and opposite, near Calico, May 11, 1884.

Stems erect, sometimes simple, usually branching and ascending, 2–5 inches in height; the leaves in all the specimens discovered are approximate and tinted a warm Indian red; the curious flowers peering out of the thick foliage display vivid contrasts of dark crimson center bordered with light rose, the whole disk traversed with radiating and branching veins of blood red. Generally associated in groups, these little plants are quite attractive with their odd reddish-green leaves, strict habit and bright-eyed flowers.

The specific name *Mohavensis* I have chosen in order to publish more extensively the peculiar region where this novelty is found. The Mohave valley is noted for many rare forms including the types of four as yet monotypic and local genera—Mohavea, Canbya, Lemmonia and Parishella—while it is the headquarters of several other odd genera of wider latitude, such as Monoptilon, Trichoptilium, Tricardia, Hesperocallis and Nicolletia, the latter, however, having a second species outside.

In this connection it may be well to report the names and localities of a few of the new species discovered during the same trip, and mostly in the same valley.

Astragalus Mohavensis, Watson, is a large, woolly species found near Newberry's station.

Astragalus acutirostris, Watson, is a slender, glabrous form in the splintered rocks above Calico mines.

Senecio Mohavensis, Gray, is a curious annual in clefts of rocks near Fort Mohave.

Phacelia invenusta, Gray, resembles *P. crenulata*, in Nevada basin near Fort Mohave. (First collected in 1880 but now recollected and just named.)

Phacelia saxicola, Gray, a delicate, tufted species, in clefts of moist granite rocks near Kingman, Ariz.

Nama depressum, Gray, forms small circular mats on the plains near Calico village.

Nama pusillum, Gray, a tiny, depressed form on gravel tables, between Waterman and Calico.

Also we find here, in a noted cañon of ancient cliff-dwellings near San Francisco Mountains, a large *Cystopteris*, uniformly bearing bulblets near the apex of the fronds. If this is the species *C. bulbifera* it has not before been reported so far west as Arizona.

Fort Moroni, near Flagstaff, Ariz., July 30, 1884.

On the Sexuality of the Fungi.[1]

BY H. MARSHALL WARD.

I propose to show that it is probable that the sexuality of the higher Fungi has disappeared, because its purpose has been equally well or better attained otherwise than by means of sexual organs.

Preliminary to this it will be necessary to be quite clear as to what sexual organs and the sexual process essentially are.

The two points common to all the cases of sexual reproduction which have been directly observed are the following:

1. A larger or smaller quantity of protoplasmic material passes from one portion (the male organ) of the same or another individual, into the protoplasm contained in another portion (the female organ).

2. The protoplasm contained in the female organ therefore becomes capable of further development; either at once, or, more generally, after undergoing a period of rest.

It is not necessary to quote the numerous cases of observed analogies between the sexual reproduction of animals and plants; but will suffice to note that the essential in the sexual process is always the addition of a portion of protoplasm from the male, to the protoplasm of the female.

But this is not all. It is now well established in embryology that the normal ovum, or female mass of protoplasm, is incapable of further development until it has received the protoplasm of the male; that the latter, in fact, incites the former to further development.

The outcome of all we know of these matters leads to the conviction that we have in the germination or development of an

[1] The statement of the important hypothesis hereby presented is somewhat abbreviated from the concluding portion of a long and interesting article by Professor Ward, given under the same title. The review of the historic progress of our knowledge of sexuality in fungi, and the present state of such knowledge, with the numerous illustrative diagrams are necessarily omitted for want of space.—EDS.

oospore—and the same is true for an egg, etc., the terms being different—simply a *renewal* of the growth of the organism; and from this and other convictions follows the result that the formation of an oosphere, although it may take place after an accumulation of large quantities of food, implies a condition of weariness—if the term may be allowed—on the part of the protoplasm for the time being. No doubt the molecular energy of the protoplasm forming the oosphere, is less than that of the rest of the plant for the time being; the access of the antherozoid or male protoplasm, however, reinvigorates the sluggish mass, and renewed life ensues. This may require some time, however, and we may possibly not be far wrong if we imagine that interval to be occupied in molecular rearrangements in the mass.

But, although we can sum up the foregoing by saying that, after a time, protoplasm requires reinvigorating by the addition of fresh protoplasm from another source, it is extremely improbable that the protoplasm of the male and female organs is at all similar.

It now remains to be seen if we can throw any light on the curious disappearance of sexual organs and sexuality in the Fungi —curious, because the sexual process appears to be all but universal in all organisms excepting the very lowest.

A hypothesis which suggests itself, and which Eidam[1] favors, and which is certainly supported by some analogies, is to the effect that the apogamous Fungi, *i. e.*, those in which the sexual organs are totally suppressed, are not always apogamous. We know that many forms only produce their sexual organs at comparatively long and rare intervals The *Mucors*, for instance, may be propagated through numerous generations by means of the asexual spores; the sexual organs only arising now and again under favorable conditions.

Moreover, the cases of polyembryony—where several embryos arise in an embryo sac, although only one oosphere is fertilized—favor the view that the effect of fertilization may be extensive; and we can not doubt that such is the case where adventitious covering branches arise after the conjugation of certain *Mucorini*, and in the *Orchideæ*, where fertilization or even the mere growth of the pollen tube affects the whole flower.

The sexual act, however, consisting as it does simply or mainly in the reinvigoration of protoplasm by the addition of protoplasm of a different nature (though we do not know the kind or limit of difference), it may be that an explanation of what occurs

[1] Cohn's Beitr. zur Biologie, etc., B. iii, H. iii.

in the Fungi is afforded by their mode of life. The Fungi in which sexual organs seem to be most certainly absent are those which are most highly specialized as parasites. Now, we have every reason to believe, first, that parasitism is a matter of degree, and secondly, that the most highly specialized form of parasitism consists in directly obtaining those contents of the cells of the host which are chemically most complex, and therefore contain most energy.

I need not dwell on the degrees of parasitism exemplified by plants which merely rob their hosts of space or moisture, or which have obtained a hold so intimate that they break it up and feed on the rotting *debris*, but may at once pass on to consider a few consequences which follow from the mode of life of those highly specialised parasites which have become so closely adapted to their host, that they exist for a time as all but an organic part of its tissues and substance.

It can scarcely be doubted that the protoplasm of a higher plant, such as a phanerogam, differs from that of a lower cryptogam in being capable of doing more work, and that the great advantage derived by a parasitic Fungus which has its life so adapted that it can tax the cells of a phanerogamous host plant, is that it contains its food materials in a condition more nearly approaching that of its own substance, than would be the case if it had to work these materials up from inorganic matters.

Now it seems not improbable that the protoplasmic substance of a higher phanerogam may contain so much energy that it can not only supply the vegetative mycelium of a parasitic fungus with all that it requires for its immediate growth, but also suffices to enable that fungus to store up enough energy in its asexual or apogamous spores to last until the next generation of the fungus gains its holdfast on another (and it may be distant) source of life-giving substance.

Let us take the case of a uredinous fungus parasitic in the leaves of a phanerogam. We know that the substances necessary for the whole growth of the phanerogam are formed in the cells of the leaf; not only so, the matters which eventually find their place in the reproductive organs must be formed there also, potentially at least. The leaf of a phanerogam so attacked, moreover, is able to support the parasitic fungus for a long time uninjured, as I have convinced myself by experiment, and there can be no doubt that substances pass into the fungus which would normally have passed into other parts of the host plant itself.

But we may imagine even this to fail after a time—we may

suppose that at length the Fungus derives too little benefit to be able to go on; or the season during which the host plant flourishes is drawing to an end.

No doubt we have in heterœcism the salvation of such a Fungus. Not only is it carried through a dangerous period, by seeking relief at the hands of a second host, but—and which I believe to be far more important—it obtains reinvigoration by the new protoplasm with which it comes in contact. We may not inaptly compare the sojourn of the Fungus on its second host, to a trip to the seaside, where the weary and enfeebled organism enjoys fresh diet and associations for a time, which in their turn pall and prepare the recipient to renew old modes of life.

We have seen that the disappearance of the sexual organs, leading to apogamy, commences especially in the lower *Ascomycetes*, and it may be more than a coincidence that epiphytic forms, which show a tendency to produce one kind of spore while on the living leaf and develope their asci on the fallen leaf are common here; such forms suggest how the parasitism and heterœcism of higher forms may have begun, and it is remarkable that the apogamy becomes more and more complete as we ascend through the latter.

It is not pretended that the hypothesis embodied above at once explains all the cases possible, and it will be well to state a few of the difficulties at once. The *Basidiomycetes* I shall not dwell upon, since our knowledge of them is still very imperfect.

The difficulty may suggest itself to many that there are parasitic fungi—such as the *Peronosporeæ*—which nevertheless develop the sexual organs in the condition typical and perfect for the group to which they belong. I have already referred to the fact that many of these forms are really saprophytes, and that others break down and destroy the tissues of their hosts—clumsily killing their prey, and then feeding on the rotten mass—and have pointed out that this is a much less specialized form of parasitism than that of the higher Fungi and *Ustilagineæ*.

Nevertheless, the sexuality shows signs of disappearance in extreme members. De Bary[1] shows that in *Phytophthora* and *Peronospora* there is a less evident passage over of protoplasm from the antheridium to the oosphere than in *Pythium;* and that in some cases, indeed, the quantity passing over is too small to be observed. I will not attempt to lay stress on the coincidence that in *Phytophthora infestans* (the fungus of the potato disease) no sexual act has yet been discovered.

[1] Beitr. zur Morph., etc., der Pilze, iv, p. 72.

Another obvious objection may be raised as follows:—The *Saprolegniæ* are in the main saprophytes, and yet they are said to be advanced towards apogamy—parthenogenetic, at any rate. The answer may be that they are saprophytic chiefly on animal protoplasm, which contains more potential energy than does vegetable protoplasm. At the same time, some *Saprolegniæ* are parasitic on plants, and *S. ferax* now appears to be parasitic on fish[1].

I may say, in conclusion, that it was during the study of the parasitic fungus of the coffee disease (*Hemileia vastatrix*)[2] in Ceylon that I was first led to speculate on the enormous amount of energy displayed by an organism which shows not the remotest satisfactory trace of sexuality, but which reproduces itself through many generations exclusively by means of asexual spores. That this energy of reproduction is derived from the coffee tree there can be no doubt, and that it is at the cost of the reproduction of the host is sadly evident; the clear inference from the fact that the coffee leaf supplies substance for the reproduction, etc., of a fungus at the expense of its own fruit, is that the fungus takes matters which are very rich in energy, so rich, indeed, that the fungus is not necessitated to sort these substances in special reproductive organs, and to secrete sexual elements, one of which would then reinvigorate the other, but may employ them forthwith for the purposes of its own relatively simpler existence and reproduction —*Quart. Jour. Mic. Sc*, April, 1884.

GENERAL NOTES.

Polarity of Lettuce Leaves.—The orientation of the leaves of *Lactuca Scariola*, which has made it one of the two best known "compass" plants, is repeated in a less degree in the leaves of the common garden lettuce. The polarity is scarcely apparent until the lettuce begins to throw up the flowering stem. It is very weak in the curled and wrinkled varieties, but it is well marked in the Cos varieties, which have flat narrow leaves much like the wild *L. Scariola*. The observation was made on over one hundred varieties of lettuce grown the present season in the garden of the New York Agricultural Experiment Station.—J. C. A.

Hibiscus Moschentos and H. roseus.—Dr. J. Guillaud, of Bordeaux, sends a pamphlet containing his investigations resulting in the identification of

[1] Prof. Huxley, 'Quart. Jour. Mic. Sc'., 1882. [It may be found upon otherwise healthy salmon, according to the investigations of Mr. George Murray. 'Science', IV, p. 27.—Eds.]

[2] ['Quart. Jour. Mic. Sc.', Jan. 1882; noticed and figured in 'Am. Nat.', July, 1882.—Eds.]

Hibiscus roseus of Thore—a species supposed to be indigenous to the southeastern coast of France, also found in Italy—with our Marsh Hibiscus. He is not aware that the same identification has been made by Mr. Daydon Jackson, and published a year or two ago in the nineteenth volume of the *Journal of the Linnean Society*, London. Dr. Guillaud has had the advantage of seeing the two plants growing spontaneously, ours in the neighborhood of New York, the other in the marshes of the Landes. *H. roseus* has also been found in North Italy, in the marshes of the Po and lagunes of the Adriatic, and, according to Dr. Guillaud, specimens have been received from Asia Minor, but no mention is made of it in Boissier's Flora Orientalis.

Is this species indigenous to Europe as well as to the Atlantic coats of North America? Is it a survival from the time when the floras of Europe and Eastern America had more common elements than they now have? Or has it somehow been conveyed across the Atlantic, and if so, whether at some early period, or within historic times? Questions not easily answered. If the first, then this plant, like a few others that might be named, is in Europe what *Convallaria majalis*, *Littorella lacustris*, *Marsilia quadriflora*, *Scolopendrium* and perhaps *Calluna* are in North America. In favor of the second view, and even of a late and casual introduction, it is to be said, as Dr. Guillaud notes, that Thore found the plant on the coast of France only at the beginning of this century; that it was unknown to Tournefort, who botanized around Bayonne in the autumn of 1688; that the plant has disappeared from the particular stations where Thore found it and where it was said to abound, and that it is now more rare than formerly. Its spread from the Atlantic coast to that of the Adriatic may be owing to the carriage of seeds by marsh birds. Indeed, Dr. Guillaud thinks it may have been brought to Europe by sea birds. On the other hand, since it is now found in the district near Mantua, he quotes the lines in Virgil's *Eclogues*, in which the stems of *Hibiscus* are twice mentioned, in a way by no means *mal-a-propos*; but he thinks they might as well apply to Marsh-mallow. It appears that the specific name *Moscheutos* came to Linnæus through Cornuti, from a "Rosa Moschentos" of Pliny, some kind of Rose-mallow, we may suppose. Since the two Linnæan species are clearly one, it is a pity that the name *H. palustris* was not chosen. Torrey and Gray are responsible for that. The reason of the choice was, that *H. Moscheutos* stands first in the book, and *H. palustris* is merely differentiated from that—reasons which need not have prevailed.

A. GRAY.

Vincetoxicum.—Following some authority, which it is now not worth while to look up, it appears that in the Synoptical Flora of N. America, I had derived this name from "*vincues*, that serves for binding" and *toxicum*. Dr. Hance, in Britten's *Journal of Botany* for May, 1883, notes, (1) that the only authority for this adjective is a line of Plautus in which *vincea* is now known to have been a mistake of some copyist for *juncea*, and (2), that the old herbalists, Fuchs and Matthiolus, clearly indicate that the Latin part of this hybrid name is from *vincere*, to conquer.

Stipules in Saxifragaceæ are of small account, as Prof. Coulter's pupils show me by sending *Mitella diphylla* with good stipules between the cauline leaves. It seems to be regularly so.

"Breweria minima," Gray, in Proc. Am. Acad. xvii, 228, is *Convolvulus pentapetaloides* of Linnæus, and doubtless was introduced into California from the Mediterranean region, probably with grain. It turns up from various parts of California of late. The style and stigmas are truly as in *Convolvulus*.

A. GRAY.

EDITORIAL NOTES.

PROF. W. W. BAILEY reports *Galinsoga parviflora* from Providence, R. I.

DR. J. SIGMUND POETSCH, lichenologist, died at Randegg, in April last.

WE notice by the *Torrey Bulletin* that Prof. W. J. Beal is preparing an illustrated work on grasses.

THE *Deutsche Botanische Monatsschrift* is an excellent journal of local botany published at Sondershausen, Germany, by Dr. Leimbach.

THE geological survey of Minnesota is printing a catalogue of the flowering plants and ferns of that State, giving their distribution, etc.

DR. J. D. COX has come to the conclusion in his study of diatom shells, as we learn from the *Amer. Mo. Micr. Journal*, that the areolæ are cavities inside the wall of the shell, while the ribs are thickening upon the surface.

MISS M. B. FLINT, writes from Duchess county, N. Y.: "*Galium verum* has recently appeared in the town of Stanford. I can trace its introduction to no cause. As Gray (Manual) restricts it to E. Mass., the mention of this station may be of interest."

THE PRESENT SEASON has been a remarkably good one for botanists in Arizona and Southern California, owing to the unusually heavy and long continued rains. Mr. Pringle, who is at work in Arizona and Sonora, writes that he is making a large and rich collection in that region, an advertisement of which will appear later.

THE NEW PART of the Synoptical Flora of N. America (Vol. I, pt. 2) is published. It comprises Caprifoliaceæ to Compositæ inclusive, 474 pages. It may be ordered of Curator of the Herbarium of Harvard University, Cambridge, Mass. Price, $5. It will be sent on receipt of this sum to any address in the United States or Canada, postpaid and *registered*.

WE HAVE RECEIVED from the author a copy of a "*List of N. B. Plants*" by Prof. James Fowler, showing that *Scirpus* (*Blysmus*) *rufus*, Schrad., was found in N. B. much earlier than the dates given by Mr. Boott in the June number of the GAZETTE, p. 85. Mr. Fowler's specimens were collected at Eel River, Restigouche county, N. B., August 1, 1873.

THE American Society of Microscopists had an interesting meeting at Rochester during August. Botanical subjects were not prominent. Dr. Dallinger and Prof. Bennett were present as delegates from the Royal Microscopical Society of London, and the latter read a paper on "Fungi found in Sewage Effluents." Prof. H. L. Smith, of Geneva, N. Y., was elected president for the coming year.

PROF. J. C. ARTHUR has been investigating the infectious nature of the pear blight, making numerous experiments at the Agricultural Experiment Station, Geneva, N. Y. Inoculations of healthy twigs, leaves and fruit caused the disease to appear quickly. Detailed results of the experiments are not yet published. A preliminary notice of the work done appears in *Bulletin No. xcii* dated August 6.

MR. JOSEPH F. JAMES, in the *Journal* of the Cincinnati Society of Natural History, announces that, "while all the genuine *Campanulas* have bell-shaped-drooping, pediceled flowers, the species of *Specularia* have rotate, erect and ses,

sile flowers." From which it would seem that the original Canterbury Bell is no longer a *Campanula!* Mr. James and Mr. Morgan accordingly transfer *Campanula Americana* to *Specularia*. But that species has not erect flowers, while a large number of *Campanulas* have; and botanists know plenty of the latter with flowers as nearly sessile as those of the Venus's Looking-glass, and several with corollas quite as rotate.

BOTANY receives due recognition in the prizes awarded by the French Academy of Sciences. Among the awards for 1883, given in May last, was the Desmazières Prize to MM. Bonnier and Mangin for their memoir on "Respiration and Transpiration of Fungi," and the Bordin Prize to M. Costantin for best treatment of the proposed subject: "Influence of environment on structure of root, stem and leaves; modifications undergone in water by land plants and those by aquatic plants compelled to live in the air; explanation of the special form of some marine plant." The Desmazière Prize for 1884 will be given for "The most useful work on cryptogamous plants," and the De la Fons Melicocq Prize for 1886 for "The best treatise on the flora of North France."

DR. T. L. PHIPSON, of London, gives some results in the *Chemical News* for July 25, of a long series of observations on the assimilation of plants. He finds that when algæ grown in spring water are constantly supplied with fresh carbon dioxide, instead of fresh water, as the experiment is usually performed, they give off less and less oxygen and finally none at all; also, that if spring water is first boiled, then impregnated with carbon dioxide, the algæ will give off little or no oxygen. He therefore concludes that green plants require something else beside carbon dioxide and sunlight in order that they may evolve oxygen, and that something he finds to be binoxide of hydrogen. The reaction is theoretically something like this: $CO_2+HO_2=CHO+O_3$, or CHO_2+O_2, or CHO_3+O, or, again, $2\,CO_2+HO_2=C_2HO_3+O_3$, etc. The conclusion if sustained is very important.

IT IS NOW PRETTY well settled that the cells of plants are not the units, separate and individual, out of which they are built. Since the discovery of the sieve tubes by Hartig in 1837, and more especially since the demonstration of the perforations in their septa and the continuity of the protoplasm through these perforations, botanists have been prepared to have the idea of protoplasmic continuity more extended. Recent investigations seem to leave little doubt that the protoplasm of plants is continuous throughout, and instead of a multitude of cells combined into a tissue we have protoplasm cut up into compartments by partition walls in various planes. These partition walls serve for mechanical support and permit a more perfect physiological division of labor. In some cases the wall plays the more important part; in others, the protoplasm. The continuity is established by means of threads of protoplasm reaching through the cell-wall. These threads are not the size of the pits which exist in almost all walls, but much smaller. In all cases the pits seem to be closed by a membrane, through which there are a few (3—5) perforations. Through these perforations run moniliform threads of protoplasm, usually curved and containing a few granules. Russow believes that these threads are coetaneous with the cell-wall, deriving them from the threads which extend between the daughter-nuclei when the cell is undergoing division, the increase in number being due to the longitudinal splitting and the formation of intervening cellulose. Gardiner holds that ordinarily the function of these threads is to permit the transmission of impulses from one part of the plant to another; while in endosperm cells and sieve tubes they "make possible a transference of solid materials."

CURRENT LITERATURE.

Manual of the Mosses of North America. By Leo Lesquereux and Thomas P. James. Boston: S. E. Cassino & Co., 1884. pp. 447, pl. 6.

The recent publication of this work is an important and valuable addition to our bryological literature, and can not fail to be highly appreciated by those interested in the study of mosses. It is in the form of an octavo of 447 pages, containing descriptions of nearly 900 species of mosses, also a glossary of terms and six plates illustrating the most important genera. All mosses thus far found within the limits of the United States, British America, Alaska and Greenland are fully described; those found in Mexico, although properly within the limit of the work are excluded.

When work on the Manual was commenced, Mr. Lesquereux, owing to failing sight, was obliged to leave the examination of specimens to Mr. James; and after the death of the latter this part of the work was continued and finished by Mr. T. Renauld, an eminent French bryologist. Mr. Sereno Watson also rendered valuable assistance in the work.

The Manual includes the advances made in bryological investigations since the publications of the late Mr. W. S. Sullivant. The classification adopted is mainly according to Schimper. It is to be regretted, however, that the habitats in many instances are deficient and do not represent the well-known ranges of the species. In the following notes I have endeavored to show the omissions. The species referred to from Colorado were collected by Mr. T. S. Brandegee, and are represented in my herbarium; a list of some of these was published in the Botany of the U. S. Geol. and Geog. Survey of the Territories by Hayden, Vol. ii., No. 3.

The varieties Torreyanum and plumosum of Sphagnum cuspidatum, are common in Southern New Jersey. Sphagnum Lindbergii, Labrador (Allen). Sphagnum Austini, Mass. (Austin); Canada, (Macoun); Green Cove Springs, Fla. (Rau). The first specimens from Florida were sent to me by Dr. G. Martin; vide BOT. GAZETTE, vol. ix., p. 26. During the month of March, this year, I also collected it in Florida. Sphagnum imbricatum, Hornsch. 1848, might be mentioned as a synonym. Under Sphagnum Portericense is mentioned "fruit unknown"; Dr. Charles Mohr sent me a specimen in fruit from Mobile, Ala. This is, I believe, the first time it has been found fruiting. This species also occurs in Florida. Sphagnum cyclophyllum and sedoides, Adirondack Mts. (Peck). Sphagnum Pylæsii, Labrador (Allen). Andræa rupestris, Lehigh Valley, Penn. (Wolle, Rau). The generic name Micromitrium, Austin in *Musci Appalach.* 1870, has also been adopted by Schimper for a very different moss from Mexico, vide *Prodromus Bryologiæ Mexicanæ*, par E. Bescherelle, 1871. According to these respective dates, Austin's name would claim priority. Austin, however, proposed to change it to Sympoma and Lindberg to Nanomitrium, in order to prevent confusion. Oreoweisia serrulata is not rare in Pennsylvania, Catskill Mountains, Watkins Glen, N. Y., etc. (Rau). Rhabdoweisia denticulata is not rare in the mountains of Pennsylvania and New Jersey (Rau), Mt. Mansfield, Vt., and Ausable Chasm, N. Y. (Pringle). Cynodontium virens, var. serratum, Colorado (Brandegee). Dicranella debilis, Texas (Rau). Fissidens obtusifolius, Colorado (Brandegee). Octoblepharum albidum, Texas (Rau). Ceratodon purpureus, var. xanthopus, Colorado (Brandegee). Eustichia Norvegica, Lawrence county, Penn. (Lesquereux). Campylosteleum saxicola, New Jersey (Austin). Pottia riparia, Bethlehem, Penn. (Rau). Drummondia clavellata, Canada (Macoun). Orthotrichum diaphanum, Colorado (Brandegee). Discelium nudum: notwithstanding the fact that I sent specimens to both authors, the habitat is meagerly given. In Austin's *Suppl. to Musci Appalach.* No. 505, the habitat of this moss is given as follows: "Clay banks, Bethlehem, Penn. (Rau); Ohio (Beardslee); also Canada and westward

to Vancouver Island (Macoun);" to which I now add Bingen and Emaus, Penn. (Wolle). Dissodon splanchnoides and Tayloria serrata, both from Colorado (Brandegee). Bartramia radicalis, Narrowsville, Penn. (T. C. Porter, E. A. Rau). Meesia tristicha, Pennsylvania (Rau); Vermont (Pringle). The New York habitat of Paludella squarrosa should doubtless be credited to C. H. Peck. Bryum Muhlenbeckii, White Mountains (Austin); Catskill Mountains (Rau). Aulacomnion turgidum, Labrador (Allen). Atrichum crispum, Closter, N. J. (Austin). Cryphæa glomerata, New Jersey (Austin); Connecticut (Rau). Neckera oligocarpa, Colorado (Brandegee) fertile; Catskill Mountains (Austin, Rau). Fabronia pusilla, incorrectly labeled F. octoblepharis in *Musci Appalach.* No. 535, Del. Water Gap, N. J. (Austin, Rau). Fabronia Wrightii, Colorado (Brandegee). Thelia Lescurii, New Jersey (Austin, Rau). Myurella Careyana, Canada (Pringle) fruiting. Leskea nervosa, New York (Austin); Colorado (Brandegee). Leskea Austini, Pennsylvania (Rau). Anomodon viticulosus, Pennsylvania (Rau). Pylaisia polyantha, Colorado (Brandegee). To the habitat of Cylindrothecium concinnum add (Brandegee). Climacium dendroides, New Jersey, (Austin); New Brunswick (Fowler). Thuidium pygmæum, New Jersey (Austin); Pennsylvania (Rau). Thuidium paludosum, Colorado (Brandegee); Connecticut, New Jersey and Pennsylvania (Rau). Brachythecium acutum, New York (Peck); New Jersey (Austin); Pennsylvania (Rau). Brachythecium Utahense, velutinum, and Fendleri, Colorado (Brandegee). Brachythecium reflexum, Lake Huron region (Mrs. Roy). Brachythecium Novæ-Angliæ has certainly a wider range than indicated. Eurhynchium diversifolium, Colorado (Brandegee); Pennsylvania (Rau). The Rhynchostegium demissum habitat needs revision. Raphidostegium Novæ-Cesareæ fruit is *not* unknown, as will be seen by referring to BOT. GAZETTE, vol. i., p. 30; fruiting specimens from Stony Creek, Carbon county, Penn., 1874 (Wolle, Rau). Plagiothecium Mullerianum, Pennsylvania (Rau). From specimens of Plagiothecium subfalcatum, Aust., which I collected at Onoko Glen, the late Mr. Austin was convinced that this species is a form of Pl. elegans. Amblystegium fluviatile, Pennsylvania (Rau). Amblystegium compactum, Colorado (Brandegee). Hypnum Bergenense, Aust. is considered identical with Amblystegium hygrophilum, Jur. by S. O. Lindberg. Hypnum nemorosum, Pennsylvania (Wolle). Limnobium eugyrium, Pennsylvania (Wolle, Rau). Pleurozium Oakesii, New York and throughout British America (Austin). Hylocomium Wrightii, Florida (J. D. Smith). Zieria julacea, Colorado (Brandegee).

The following mosses are omitted from the work, although of sufficient importance to be included:

Hypnum thelistegium, C. M., Florida; Aust. Musci App. Suppl., No. 505. H. homalostegium, C. M., Alabama (Mohr). H. occidentale, S. and L., Oregon (Hall); Sull. Icon. Musc. Suppl., p. 105, t. 81. Trichostomum macrostegium, Sull., Alabama (Mohr); Sull. Icon. Musc. Suppl., p. 35, t. 22. Dicranum Richardsoni, Hook., Greenland fide James in Kane's Arctic Explor., vol. ii. Dicranella Canadensis, Mitt., British America (Drummond, Macoun). According to Sch. Syn. Musc. Europ., the following occur in North America: Dicranum arcticum, Schp., Greenland and Labrador; Tetraplodon mnioides, vars. Adamsianus and cavifolius, Arctic regions.—EUGENE A. RAU, *Bethlehem, Pa.*